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## ABSTRACT

A study investigated how eighth grade students used a microcomputer-based word processing system for composing. Five students, with a range of writing skills, used the technology across 10 class sessions. Data were gathered through interviews with the students about their models for composing, experiences that influenced their writing development, and opinions about the computer as a medium for writing. In addition, the students were systematically observed during class sessions and printouts of text files from each student were reviewed. Results showed that students initially assimilated composing with the computer to their general models of composing. As with pencil and paper, they produced text linearly, trying to write each sentence perfectly before going on to the next. Most revisions were corrections of spelling or punctuation. However, there was some evidence that the computer could be used to promote involvement with composing, focus attention on the overall organization of the text, provide opportunities for practicing revision procedures, and create a context for experimenting with alternative texts. (Author/FL)

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## COMPUTERS FOR COMPOSING

Janet H. Kane

Paper Presented at the Annual Meeting of the  
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## Abstract

This study investigates how eighth-graders used a microcomputer-based word processing system for composing. Five students, with a range of writing skills, used the technology across 10 class sessions. Three methods of data collection were used: 1) interviews about a) their model for composing, b) experiences that influenced their development as writers, and c) evaluation of the computer as a medium for writing; 2) systematic observation of students during class sessions; and 3) printouts of text files from each class session.

Findings support the conclusion that initially students assimilated composing with the computer to their general model of composing. As with pencil and paper, they produced text linearly, trying to write each sentence perfectly before going on to the next. Most revisions were corrections of spelling or punctuation. However, there was some evidence that the computer can be used to promote involvement with composing, focus attention on the overall organization of the text, provide opportunities for practicing revision procedures, and create a context for experimenting with alternative texts.

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### Introduction

Experienced writers compose in many drafts. They revise early drafts structurally and conceptually and modify individual words and sentences in later drafts (Bartlett, 1981; Calkins, 1979; Graves, 1978; and Nold, 1981). The goals of this process are to explore and clarify ideas and to create a written text that communicates effectively with the intended audience. For expert writers, the composing process, with its components of planning, writing, and revising, is reader-directed and iterative, incorporating a wide variety of strategies for revision.

Students' models of the composing process contrast sharply with those of skilled writers. Students strive to make their compositions "right" the first time (Shaughnessy, 1977). Before starting to write, they mentally organize their ideas. Their goal is to tell what they know, rather than to refine their understanding or to have a particular effect on the readers (Flower, 1979 and Scardamalia and Bereiter, 1982). When they write, they start with the first sentence and continue linearly until they are finished. Except for corrections in spelling and punctuation, students rarely modify their texts (Bartlett, 1981; Emig, 1971). Most do only two drafts, the second merely a neater

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and more legible copy of the first. For student writers, the composing process, with its stages of planning, writing, and revising, is sequential, with revisions primarily limited to corrections in spelling and punctuation and changes in wording or phrasing.

Once a draft is written, changes are mechanically difficult. Erasing makes the paper look sloppy. Adding words, sentences, or paragraphs, or reordering the text is impossible without tedious recopying or cutting and pasting. Once a text is written, it may as well be carved in stone.

While teachers describe the multiple drafts of expert writers, they seldom require students to do several drafts of the same paper. Usually, the teacher will critique one assignment, and assume that the students will be able to incorporate the suggestions when writing on another topic.

What if text were easy to change? Would students compose more like expert writers if the mechanical difficulties of modifying their written texts were minimized? Would teachers expect students to actually make revisions of their papers?

Word processing technology was developed to facilitate the production and revision of printed materials. With it, words, phrases, sentences and even paragraphs can easily be inserted or deleted from a written text by simply pressing a few keys.

While the cost of dedicated word processing equipment puts it out of reach of most schools, relatively low cost software is available for use with microcomputers. Microcomputers are already

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in many schools across the nation, though they are usually used for mathematics or programming. With word processing software, the microcomputer can be a tool for students in the humanities also.

In the fall of 1981, under a grant from the Richard Loundsberry foundation, we began to explore the potential of word processing technology for promoting the development of composing skills, with special emphasis on revision.

## Software Selection

Our first task was to find word processing software that seemed suitable for eighth-graders. We reviewed many of the commercially available systems, and were impressed by the range of capabilities. However, we felt that most of them were not appropriate for writers with little or no experience with computers and limited opportunities to learn about them. Most systems were more suitable for businesses than authors.

In an office, typically one person composes a text and a different person types it. Still others may revise and edit it. A word processing system designed to format and change texts that others have written is necessarily quite different from one designed to be used while composing.

The most obvious difference is in the cognitive demands that can be placed on the user. In an office, the individual who is putting the text in a presentable form is only minimally concerned with its meaning. This staff member does not struggle with the

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problem of how to effectively reach the intended audience. Word processing specialists can learn the intricacies of a system, practicing the commands until they are used automatically. They can interrupt their typing to consult reference materials for the individual steps of a complex procedure. In contrast, writers are primarily occupied with composing coherent and compelling texts. If writers must attend to the complexities of using a word processing system, the quality of the writing may be compromised.

We did find a few word processing systems that seemed relatively easy to use. None, however, seemed ideal for student writers. Each had advantages as well as what to us seemed like serious drawbacks. Three of these were reviewed by a panel of students. Twelve eighth-graders learned the fundamentals of each system, and used it to revise a short passage and to compose a short text. After using all three systems, the students evaluated them, and described the features they preferred as well as those that made a system difficult to use. On the basis of their comments, APPLEWRITER was selected.

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### Research Design

This exploratory study was designed to provide insight into two questions:

A. Can students use this word processing technology? Is it sufficiently easy to use so that it will not interfere with composing?

B. Will students become more fluent and more flexible writers by using word processing technology?

#### The participants

One teacher and five eighth-graders (one girl and four boys) from the Bank Street School for Children participated in this exploratory study. (Another girl was selected, but missed most of the classes because she had chicken pox.) The teacher was an experienced teacher of writing, as well as a writer herself. She valued students' critiquing and revising their own and others' work, and was interested in learning to use word processing software. The teacher had not had any previous experience with computers.

The students were selected from a larger group of volunteers. The participants represented a wide range of writing skill. Some wrote very fluently and others continually struggled with expressing ideas and emotions through written language.

Two had used computers before. The girl had a computer in her home and had learned to write simple programs in BASIC from her

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father. One of the boys occasionally did some simple programming on a computer at his father's office. The other three students' experience with computers was limited to video games.

In addition to the teachers and students, two researchers attended each class session to help the teacher and students use the equipment as well as to study and record how it was used.

### The setting

Students used the word processing system as part of a five-week minicourse that met for two forty-five minute sessions each week. They came to a computer workroom, where they each had a computer, a video monitor, and a disc drive. Two printers were also available. At each session, students who were first to arrive had their choice of equipment.

At the first class session, the teacher briefly explained the purpose of the class. The researchers demonstrated the use of the word processor, and each student was given a disk and a reference sheet describing commonly-used commands. Then, students were encouraged to start composing. They had their choice of composing at the computer, or writing on a sheet of paper and then entering the text.

As students wrote, the teacher moved around the room, observing their writing and asking or answering questions. The two researchers were also available to demonstrate how to use a particular procedure or to help with equipment problems.

Ten minutes before the end of each class, students were

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encouraged to finish up their work for the day and to print out a copy if they wanted one. Sometimes the teacher asked a student to make a copy for her to look over and comment on for the next class.

## The writing curriculum

At the Bank Street School For Children, writing is encouraged and valued as a means of exploring and expressing ideas and feelings. Students receive honest and constructive criticism of their own work from both peers and teachers and learn about features of effective text as well as strategies for revision. Students write frequently and regularly, making daily entries in their personal journals and preparing 3-4 page reports for each curricular unit.

In the minicourse, students were to write expressively. They were told to begin by writing whatever came to mind, and to continue without concern for structure or transition. Their goal was to explore topics through writing, and then to develop a plan for what they wanted to communicate.

## Data collection

Interviews. Prior to the minicourse, all students were individually interviewed about their models for composing, their development as writers, their standards for effective writing, and their strategies for revision.

After completing the minicourse, students were again interviewed to learn about their reactions to word processing

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technology as a medium for composing.

Observations. At each class session, students' activities were recorded at five minute intervals. In addition, one or two students were observed as they composed and/or revised their written text, and the kinds of changes they made were recorded.

Writing samples. In addition to the observational data, copies of each student's files were made at the end of every class session, and the files were compared across sessions.

## Composing with the Computer

In the minicourse, students generally spent 5-6 class sessions composing a piece (or, in the case of one student, deciding to abandon it). The first 1 or 2 sessions usually involved very little writing. Students seemed to be thinking about potential topics. Once they had found a topic, the next 2 - 4 sessions were mainly spent writing the body of the paper. Students seldom made typographical mistakes because they typed very slowly and deliberately, but when they did they usually corrected them immediately using the function key for deleting.

The girl in the minicourse was a fluent writer. She composed a lengthy narrative about a vacation adventure, approaching her writing enthusiastically with a clear idea of what she wanted to communicate. She was concerned with making the story interesting and entertaining, and made several changes to make the text more appealing.

She made quite a few revisions in her text, spending part of each session modifying what she had written previously. She added and deleted sentences within her text, inserted words to clarify meanings, and made substitutions of words and phrases. Once she brought in a printout that she had revised at home and implemented most of the changes she had planned. In another session, she changed her text in ways prompted by the teacher's comments.

The other minicourse students seemed to compose through association. After writing a sentence, they would read it over and decide whether to keep it or delete it. Then they would sit for a long time, contemplating their next sentence. They did not seem to have a general goal to guide their production. From one session to the next, these students would simply extend their texts. The only changes they would make to previously written texts would be to correct spelling or punctuation. After several sessions, two students seemed to discover their meaning, and organized their text into paragraphs. A third student didn't finish, but simply stopped after urging from the teacher. A fourth was never satisfied with his text, and spent the entire course starting over, rather than developing his text.

All students started one or two other texts, but none had time to finish them during the minicourse. The composing process seemed similar to that observed with the first text.

## Conclusions

### A. Can students use this word processing system?

All students were able to use the technology for composing, and all said they would like to use it regularly for both school assignments and personal writing. Students preferred the computer to paper and pencil. Throughout the course, paper and pencils were available on a table in the center of the room. Only once did a student choose to move away from the computer and work with a pencil.

Generally students composed with the computer as they composed with paper and pencil. The new technology was assimilated to their models for composing. Production was primarily linear and sequential. Most revisions were corrections in punctuation or spelling, though one student added, deleted, and reordered sentences within her text.

None of the students was a proficient typist, but two had had some instruction in touch-typing and knew the position of the fingers on the keyboard. The other students typed very slowly and laboriously, searching for each key and using only one finger. Even these students, however, were persistent with composing using the technology. Students were asked about their typing skills in the post-course interview. While most said they'd like to learn to type better, no student felt that lack of typing skill was an impediment to composing with the computer.

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B. Will students become more fluent and more flexible as writers by using this word processing technology?

The 10-session minicourse was too brief to effect any fundamental changes in students' models for composing. These models were developed over many years of schooling, and could hardly be significantly modified in the equivalent of a mere six hours of instruction. However, results of the minicourse point to six ways the technology could support students' development as writers.

1. Students spend more time composing when they use a word processing system.

Students' skills may improve simply as a result of spending more time writing. Using the computer, students created, extended and/or revised their texts across 5 or 6 sessions. This contrasts dramatically with their reports that with paper and pencil they usually composed a paper in a single sitting of 30-45 minutes.

The students were also intensively involved with composing at the computer. The teacher had planned for students to read their work to each other, but she found that she could not get them to stop working. At many of the sessions, the room was eerily quiet. Students didn't talk to each other, but were absorbed with their own composing.

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2. Students feel free to explore their ideas in writing, because deleting is easy, even from the middle of the text.

All students in the minicourse used the word processor to delete sentences and paragraphs. This, in part, resulted from the teacher's encouragement to write, rather than to delay until the paper was entirely thought out. However, the fact that students were able to suspend judgement before writing demonstrates that students did feel freed from the overwhelming constraints imposed by trying to make the written text perfect the first time. Usually, students did not delete sections of text until they had written most or all of it. Knowing that the text was easy to change allowed the students to ignore some of what they wrote and to concentrate on other sections. Students seemed to prefer the more transient CRT display to the permanent printout. After the first session, students seldom made a copy until they were finished with the text.

3. When using the computer, students consider the overall structure of their text.

In pre-course interviews, students said they never reorganized a handwritten text unless they were told to by their teacher. In the minicourse, all four students who finished a piece modified the paragraph structure. Two students initially had no paragraphs in their compositions, and spent some time dividing their work into paragraphs. Two others improved their work by rearranging the order of paragraphs.

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4. Using word processing technology may facilitate use of the revision strategies students have already learned, eventually resulting in their automatic application.

When revising their texts, students most often choose to modify individual words or phrases - often adding or changing them to more vividly or more particularly describe a character, a setting, or an event. These changes did not happen very often - perhaps 10 words in a entire composition - but they were effective.

5. Students will be motivated to learn new strategies for evaluating and revising their texts because changes are easy to execute with a word processor

Judging from their interview comments, students had few explicit strategies for revision. Their main goal was to write what they were thinking or feeling. When asked, "How do you know when you've finished writing?", no student could respond. Most did remark, however, that producing an ending or conclusion was one of the most difficult parts of composing.

Students also reported that they did not usually think about their audience as they wrote. One student said that thinking about the audience made it more difficult to write, so he preferred to concentrate on his message. Text features such as comprehensibility, enticingness, persuasiveness, and memorability were not considered by most of these eighth-grade writers. (See

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Bruce, et al, 1982 for discussion of these criteria for communicative effectiveness.)

6. The computer can influence the extent of collaboration while writing.

Initially, we hypothesized that with a computer, composing would become more public. Displaying the text on the screen would invite others to read it, and would set the stage for peer discussions of a text. Through such critiquing, we felt that students would develop new standards for evaluating texts and acquire new procedures for revision. Contrary to these expectations, writing became less public in the minicourse. Students were so involved with their own texts, they seldom spoke with others. Only once did a student ask another to read his work.

On reflection, we feel that this occurred because students had their own computers, and wanted to use this resource as much as possible. If a small number of computers are in a classroom, it will be easier to arrange for two or more students to use them collaboratively. However, if the computer is located in a resource room, and students are sent to work individually with the equipment, the computer may undermine attempts to promote collaboration while composing.

## Discussion

Word processing systems vary enormously in their complexity and

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ease of use. After reviewing a wide range of software, we concluded that many systems required too much time to learn to be practical for students and teachers with little or no previous experience with computers. In this research, we have studied students' use of a system that was selected precisely because a review panel of eighth graders judged it easy to use.

Students who used the selected word processing system for 10 class sessions did find it easy to use. A major conclusion from this exploratory study is that initially students assimilate the technology to their model for composing. They use it as they use paper and pencil. Production is primarily linear and sequential. Most revisions are corrections in spelling and punctuation, though occasionally a single word or phrase is inserted or replaced.

In this study, students also capitalized on some of the features of the technology. It seems that their models of composing might be restructured to accommodate to the technology. For example, all students modified the organization of their texts, even though they rarely reorganized handwritten texts.

The word processor can not teach students to be better writers. It only provides a means to effect changes more easily. It will not respond to the author's message. It cannot critique, nor can it recommend particular changes or judge whether a change is an improvement (though, see the Writer's Workbench for a prototype of such a system - Macdonald, Frase, Gingrich, and Keenan, 1982). Unless students have standards of good writing, and can evaluate and revise their own work in terms of these standards, changes will

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not be improvements.

As Donald Graves' work documents (Graves, 1983), students develop as writers when their teachers value students' expressing their own ideas, discuss students' writing with them, and instruct them in the effective use of written language. In successful writing programs, attention is on the meaning the author intends to communicate and the meaning the reader will construct from the text.

Although writing skills develop as students communicate through writing, the word processor may prove to be a useful curricular tool. With a tool that eliminates the tedious recopying that is now part of revising, students may be eager to develop strategies to evaluate and improve their texts.

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